10th Class 2014

Biology	Group-I	Paper-II
Time: 2.45 Hours	(Subjective Type)	Max. Marks: 63

Part-I

2. Write short answers to any Six (6) questions: 12

(i) Define Epiglottis. Write its function.

Ans Epiglottis is made of cartilage on the root of tongue. It prevents food from entering trachea during the process of swallowing.

(ii) What is difference between inhalation and exhalation?

Ans **1. Inhalation:**

During inspiration, the rib muscles contract and ribs are raised. At the same time, the dome-shaped diaphragm contracts and is lowered. These movements increase the area of the thoracic cavity, which reduces the pressure on lungs. As a result, the lungs expand and the air pressure within them also decreases. The air from outside rushes into the lungs to equalize the pressure on both sides.

2. Exhalation:

After the gaseous exchange in the lungs, the impure air is expelled out in exhalation. The rib muscles relax bringing the ribs back to the original position. The diaphragm muscles also relax and it gets its raised dome shape. This reduces the space in the chest cavity and increases the pressure on lungs. The lungs contract and the air is expelled out of them.

(iii) What is Asthma? Write its symptoms.

Ans **Asthma:**

Asthma is a form of allergy, in which there is inflammation of the bronchi, more mucous production and narrowing of the airways. In asthma patients, the bronchi

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and bronchioles become sensitive to different allergens (allergy causing factors) *e.g.*, dust, smoke, perfumes, pollens, etc. When exposed to any of such allergens, the sensitive airways show immediate and excessive response of constriction. In this condition, the patient feels difficulty in breathing.

The symptoms of asthma vary from person to person. The major symptoms include shortness of breath (especially with exertion or at night), wheezing (whistling sound when breathing out), cough and chest tightness.

(iv) What is guttation? How does it differ from dew?

Ans If there is a high water content in soil, water enters the roots and is accumulated in xylem vessels. Some plants such as grasses force this water through special pores, present at leaf tips or edges, and form drops. The appearance of drops of water on the tips or edges of leaves is called guttation. Guttation is not to be confused with dew, which condenses from the atmosphere onto the plant surface.

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(v) What do you mean by kidney stone?

Ans When urine becomes concentrated, crystals of many salts *e.g.*, calcium oxalate, calcium and ammonium phosphate, uric acid etc. are formed in it. Such large crystals cannot pass in urine and form hard deposits called kidney stones. In surgical treatment, the affected area is opened and stone(s) are removed. Lithotripsy is another method for the removal of kidney stones.

(vi) What is skin? Write its function.

Ans Our skin consists of two layers. Epidermis is the outer protective layer without blood vessels while dermis is the inner layer containing blood vessels, sensory nerve endings, sweat and oil glands, hairs and fat cells.

Skin performs important role in the regulation of body temperature and also removes excess water and salts.

(vii) Define coordinators. Give an example also.

Ans These are the organs that receive information from receptors and send messages to particular organs for proper action.

In nervous coordination, brain and spinal cord are coordinators.

(viii) What is difference between Sensory Neurons and Interneurons?

Ans **Sensory neurons** conduct sensory information (nerve impulse) from receptors towards the CNS. Sensory neurons have one dendrite and one axon.

Interneurons form brain and spinal cord. They receive information, interpret them and stimulate motor neurons. They have many dendrites and axons.

(ix) Write disorders of eye.

Ans **Disorders of the Eye:**

The working of eye is affected by the changes in the shape of eyeball.

Myopia (Short sight):

The elongation of eyeball results in myopia. Such persons are not able to see distant objects clearly. The image of a distant object is formed in front of retina. This problem can be rectified by using concave lens.

Hypermetropia (Long sight):

It happens when eyeball shortens. Such persons are not able to see near objects clearly. The image is formed behind retina. Convex lens is used to rectify this problem.

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3. Write short answers to any Five (5) questions: 10

(i) Define Cartilage. Write names of its two types.

Ans **Cartilage:**

Cartilage is a dense, clear blue-white firm connective tissue (but less strong than bone). The cells of cartilage are called chondrocytes. There are three types of cartilage:

1. Hyaline cartilage
2. Elastic cartilage

3. Fibrous cartilage

(ii) Differentiate between origin and insertion of a Skeletal Muscle.

Ans One end of a skeletal muscle is always attached with some immoveable bone. This end of muscle is called the **origin**. Other end of muscle is attached with a moveable bone and is called the **insertion**. When a muscle is stimulated by a nerve impulse, it contracts to become shorter and thicker. Due to this contraction, it pulls the moveable bone (at insertion).

(iii) What are hinge joints? Write two examples.

Ans Hinge joints move back and forth like the hinge on a door and allow movements in one plane only. The knee and elbow are hinge joints.

(iv) Describe the process of spore formation in 'Rhizopus'.

Ans When Rhizopus reaches reproductive age, its body cells form thick walled spore sacs called sporangia (sing. sporangium). Inside each sporangium, a cell divides many times and forms many daughter cells called spores. Each spore is covered with a thick wall called cyst and it can survive unfavourable conditions. When sporangia are mature, they burst and release spores. Under favourable conditions, the spores germinate and develop into new Rhizopus.

(v) What is Semen? Name two glands which pour their secretions into it.

Ans **Semen** is the material containing sperms in a fluid. It consists of 10% sperms and 90% fluid. As the sperms pass down the ducts from testes to urethra, the associated glands add various secretions.

For example,

1. Prostate gland 2. Cowper's glands

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(vi) What are Homologous Chromosomes? How many of these exist in man?

Ans The body cells have a constant number of paired chromosomes. The two chromosomes of a pair are known as homologous chromosomes.

In human body's cells, there are 23 pairs of homologous chromosome for a total of 46 chromosomes.

(vii) What will be Genotype of plants produced as a result of cross between two plants having Genotype R?

Ans When two plants of Rr genotype are crossed, the genotype of plants produced will be 1:2:1.

(viii) Define a Gene. Write symbols of Genes for any two trails.

Ans Parents pass characteristics to their young through gene transmission. Equal numbers of chromosomes from each parent are combined during fertilization. The chromosomes carry the units of inheritance called the gene. For traits, for example, in man height, colour of the eyes, etc.

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4. Write short answers to any Five (5) questions: 10

(i) What is meant by Producers? If these are eliminated from Ecosystem, what will happen?

Ans The producers are the autotrophs present in an ecosystem. Producers include plants, algae and photosynthetic bacteria. These organisms are able to synthesize complex organic compounds (food) from inorganic raw materials. Producers form the basis of any ecosystem. In terrestrial ecosystems, plants are the main producers. In aquatic ecosystems, the main producers are the floating photosynthetic organisms (mainly algae) called phytoplankton and shallow water rooted plants.

(ii) Write down two methods of Nitrogen Fixation.

Ans Conversion of nitrogen gas into nitrates is called nitrogen fixation. It occurs in the following ways:

1. Atmospheric nitrogen fixation
2. Biological nitrogen fixation

(iii) Define Symbiosis. Give one difference between Mutualism and Commensalism.

Ans **Symbiosis:**

It is a relationship between members of different species, in which they live together for longer or shorter periods of time.

Difference between Mutualism and commensalisms:

Mutualism	**Commensalism**
In this type of symbiotic interaction, both partners (of different species) get benefit and neither is harmed.	It is a type of symbiosis in which one partner is benefited while the other is neither benefited nor harmed.

(iv) What is Fermenter? Give its types.

Ans **Fermenter:**

Fermenter is a device that provides optimum environment to microorganisms to grow into a biomass, so that they can interact with a substrate, forming the product. Fermentation is carried out in fermenters, in the following two ways:

1. Batch Fermentation 2. Continuous Fermentation

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(v) What is meant by Recombinant DNA Technology? Give its one benefit.

Ans Genetic engineering or recombinant DNA technology involves the artificial synthesis, modification, removal, addition and repair of the genetic material (DNA). If host organism is a microorganism, such as a bacterium, the transferred DNA is multiplied many times as the microorganism multiplies. Consequently, it is possible to obtain millions of copies of a specific DNA inside a bacterial cell.

(vi) What is meant by Single Cell Protein? How are these produced?

Ans Single-Cell Protein (SCP) refers to the protein content extracted from pure or mixed cultures of algae, yeasts, fungi or bacteria. For the production of single-cell proteins, the microorganisms are grown in fermenters. These microorganisms utilize a veriety of substrate like agricultural wastes, industrial wastes, natural gas like methane etc. Microorganisms grow very vigorously and produce a high yield of protein.

(vii) Define Drug. Name one synthetic Drug.

Ans Any substance that, when absorbed into the body of a living organism, alters normal body function is known as a drug. There are many synthetic drugs. *i.e.*, Drugs from plants and fungi, etc.

(viii) Define Vaccine. Give its`working briefly.

Ans **Vaccines:**

A vaccine is a material containing weakened or killed pathogens and is used to produce immunity to a disease by stimulating the production of antibodies.

When a vaccine *i.e.*, weakened or dead pathogen is introduced into bloodstream, the white blood cells are stimulated. B-lymphocytes recognize the weakened or dead pathogens as enemies and start producing antibodies against them. These antibodies remain in blood and provide protection against pathogens. If real pathogens enter blood, the already present antibodies kill them.

Part-II

NOTE: Attempt any Three (3) questions.

5.(a) Explain lung cancer and passive smoking. (4)

Ans **Lung Cancer:**

Lung cancer is a disease of uncontrolled cell divisions in the tissues of the lung. The cells continue to divide without any control and form tumours. The cellular growth may also invade adjacent tissues beyond the lungs. The most common symptoms are shortness of breath, coughing (including coughing up blood) and weight loss.

The main causes of any cancer include carcinogens (such as those in cigarette smoke), ionizing radiation and viral infection. Smoking is the main cause of lung cancer. This risk of lung cancer is significantly lower in non-smokers. Cigarette smoke contains over 50 known carcinogens.

Passive smoking (the inhalation of smoke from another's smoking) is also a cause of lung cancer. The smoke from the burning end of a cigarette is more dangerous than the smoke from the filter end.

Eliminating tobacco smoking is a primary goal in the prevention of lung cancer. The World Health Organization has called for governments to stop tobacco advertising to prevent young people from taking up smoking.

(b) Draw the labelled diagram of human kidney. (3)

Ans

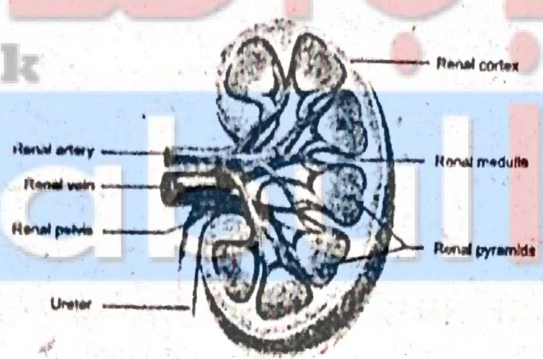

Fig. The anatomy of a kidney.

6.(a) Explain various types of Nerves. (4)

Ans **Nerve:**

A nerve means the union of several axons that are enveloped by a covering made of lipid. Based on the property of axons, the nerves are classified into three types:

1. **Sensory nerves** contain the axons of sensory neurons only.
2. **Motor nerves** contain the axons of motor neurons only.

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3. **Mixed nerves** contain the axons of both *i.e.*, sensory and motor neurons.

In certain parts of body, the cell bodies of many neurons form a group enveloped by a membrane. This is called ganglion.

(b) Explain three types of Joints. (3)

Ans **Joints:**

"A joint is the location at which two or more bones make contact. They allow movement and provide mechanical support."

Joints can be classified on the basis of the degree of movement they allow:

Immoveable (Fixed) joints:

Such joints allow no movement *e.g.,* the joints between the skull bones.

Slightly moveable joints:

Such joints allow slight movements *e.g.,* joints between the vertebrae.

Moveable joints:

They allow a variety of movements *e.g.,* shoulder joint, hip joint, elbow joint, knee joint, etc. There are many types of moveable joints in body. The main types are hinge joints and ball-and-socket joints. Hinge joints move back and forth like the hinge on a door and allow movements in one plane only. The knee and elbow are hinge joints. Ball-and-socket joints allow movement in all directions. The hip and shoulder joints are ball-and-socket joints.

7.(a) Explain Budding with example. (4)

Ans **Budding:**

In this type of asexual reproduction, a bud develops as a small outgrowth on parent's body. In case of yeast (a unicellular fungus) a small bud is formed on one side of cell. The nucleus of cell divides and one of the daughter nuclei is passed into the bud. Parent cell may form more than one bud at a time. Each bud enlarges and develops the characteristics of parent organism. The bud may separate from parent body. In some cases, the buds never separate and as a result, colonies of individuals are formed.

Animals such as sponges, Hydra and corals also reproduce by means of budding. In them, a small bud is formed on the side of body, by mitosis. This bud enlarges by the formation of more cells. It then detaches from the parent body and grows into new organism.

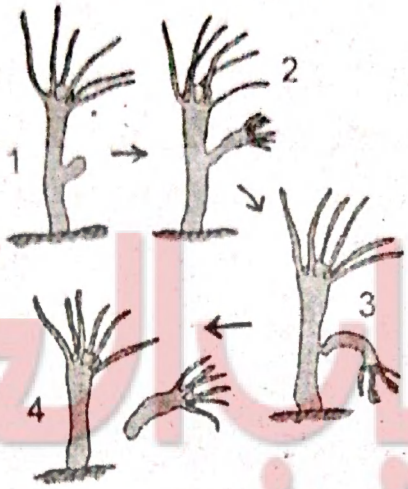

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Fig. Budding in Hydra.

In corals, the buds do not detach from the parent body. Corals form big colonies, because the buds grow into new organisms by remaining attached to the parent body.

(b) Write a note on Female Reproductive System of Rabbit. (3)

Ans The female reproductive system of rabbit consists of ovaries and associated ducts. Ovaries are small oval organs situated in abdominal cavity just ventral to kidneys. Like most animals, female rabbits have a pair of ovaries. The outer region of ovary produces egg cells. A cluster of specialized cells called follicle surrounds and nourishes each egg cell. From ovaries, egg cells are released in fallopian tubes.

The opening of fallopian tube lies close to ovary. Fertilization occurs in fallopian tubes and the fertilized egg (zygote) is carried to uterus. The uterus of rabbit is divided into two separate parts or horns. The uterus horns join and open into vagina or birth canal. Cervix is the portion of uterus, which separates it from birth canal, where sperms of male are deposited.

8.(a) How does DNA of Chromosome work? (4)

Ans DNA is the genetic material *i.e.,* it contains the instructions to direct all the functions of cells. It performs its role by giving instructions for the synthesis of specific proteins. Some proteins perform structural roles while the others act as enzymes to control all biochemical reactions of cells. In this way, whatever a cell does, is actually controlled by its DNA. In other words, DNA makes the characteristic or trait of cell or organism. Let us see how DNA is responsible for this.

Traits are made by specific proteins. Specific proteins have specific number and sequence of their amino acids. DNA controls this sequence of amino acids by the sequence of its nucleotides. During protein synthesis, the sequence of DNA nucleotides decides that what will be the sequence of amino acids. For this purpose, the specific sequence of DNA nucleotides is copied in the form of messenger RNA (mRNA) nucleotides. This process is called **transcription**. The mRNA carries the sequence of its nucleotides to ribosome. The ribosome reads this sequence and joins specific amino acids, according to it, to form protein. This step is known as **translation.**

The part of DNA (sequence of nucleotides) that contains the instructions for the synthesis of a particular protein is known as a gene. DNA of each chromosome contains thousands of genes. Like chromosomes, genes also occur in pairs, one on each homologous chromosome. The locations or positions of genes on chromosomes are known as **loci** (Singular locus).

Each gene determines a particular trait in an organism. Each individual carries at least one pair of genes for each trait. For convenience, pairs of genes are represented by a letter or symbol. Both members of a gene pair may be the same in some individuals (a condition which we may represent as AA or aa or BB) and different in others (Aa or Bb). It means that a gene exists in more than one alternate forms. In the above example, 'A' and 'a' are the two alternate forms of a gene and 'B' and 'b' are the alternate forms of another gene. The alternate forms of a gene are called **alleles**. If an individual has Aa gene pair, 'A' and 'a' are the alleles of one another. In this individual, allele 'A' is located on one of the two homologous chromosomes and the allele 'a' is on the other chromosome. When chromosomes separate during meiosis, alleles also separate and each gamete gets one of the two alleles. When gametes of both parents unite, the zygote (and the offspring also) receives one allele from each parent.

(b) Describe biotic components of an Ecosystem. (3)

Ans The biotic components comprise the living part (organisms) of the ecosystem. Biotic components are further classified as producers, consumers and decomposers.

The **producers** are the autotrophs present in an ecosystem. Producers include plants, algae and photosynthetic bacteria. These organisms are able to synthesize complex organic compounds (food) from inorganic raw materials. Producers form the basis of any ecosystem. In terrestrial ecosystems, plants are the main producers. In aquatic ecosystems, the main producers are the floating photosynthetic organisms (mainly algae) called phytoplankton and shallow water rooted plants.

The **consumers** are heterotrophs. They cannot synthesize their food and so depend upon producers for food. Consumers include all animals, fungi, protozoans and many of the bacteria. The animals are the major consumers of ecosystems. They are further classified as herbivores and carnivores.

Herbivores *e.g.*, cattle, deer, rabbit, grasshopper, etc. feed on plants. They are the **primary consumers**. They feed directly on plants or products of plants.

Carnivores feed on other animals. Primary carnivores (**secondary consumers**) feed on herbivores. Fox, frog, predatory birds, many fishes and snakes etc. are primary carnivores. Secondary carnivores (**tertiary consumers**) feed on primary carnivores. Wolf and owl etc. are secondary carnivores. Tertiary carnivores *e.g.*, lion, tiger, etc. feed on secondary carnivores.

Decomposers or reducers break down the complex organic compounds of dead matter (of plants and animals) into simple compounds. They secrete digestive enzymes into dead and decaying plant and animal remains to digest the organic material. After digestion, decomposers absorb the products for their own use. The remaining substances are added to environment. Many types of bacteria and fungi are the principal decomposers of biosphere.

9.(a) Define Biotechnology. Give its scope and importance in three different fields. (4)

Ans Biotechnology is defined as the use of living organisms in processes for the manufacture of useful products or for services.

The following are some areas of the application of biotechnology.

Biotechnology in the Field of Medicine:

In the field of medicine, biotechnologists synthesized insulin and interferon (antiviral proteins) from bacteria and released for sale. A large number of vaccines and antibodies; human growth hormone and other medicines have also been produced. Various enzymes are being synthesized for medicinal as well as industrial use. Gene therapy (treatment through genes) has become important in recent years. Biotechnology also proved much beneficial in forensic medicine. The study of DNA helps in the identification of criminals..

Biotechnology in the Field of Food and Agriculture:

Fermented foods (*e.g.*, pickles, yogurt), malted foods (*e.g.*, powdered milk: a mixture of barley, wheat flour and whole milk), various vitamins and dairy products are produced by using microorganisms. Wine and beer are produced in beverage industry. Biotechnology has also revolutionized research activities in the area of agriculture. Transgenic (organisms with modified genetic set-up) plants are being developed, in which desirable characteristics are present *e.g.*, more yields and resistance against diseases, insects and herbicides. Transgenic goats, chickens, cows give more food and milk etc. Many animals like mice, goats, cows, etc. have been made transgenic to get medicines through their milk, blood or urine.

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Biotechnology and Environment:

Biotechnology is also being used for dealing with environmental issues, like pollution control, development of renewable sources for energy, restoration of degraded lands and biodiversity conservation. Bacterial enzymes are used to treat sewage water to purify. Microbes are being developed to be used as biopesticides, biofertilizers, biosensors, etc. Such transgenic microorganisms are also used for the recovery of metals, cleaning of spilled oils and for many other purposes.

(b) Write note on Sedative Drugs and Hallucinogen Drugs. **(5)**

These drugs interact with central nervous system to depress its activities. Sedative drugs induce dizziness, lethargy, slow brain function and depression. Long-term use of sedatives induce suicidal thoughts.

Hallucinogens:

Hallucinogens are the drugs that cause changes in perception, thought, emotion and consciousness. The group includes mescaline, which comes from a cactus and psilocin, which comes from a mushroom.

Physiologically, hallucinogens affect on the sympathetic nervous system, causing dilation of pupils, constriction of some arteries and rise in blood pressure.

Part-III

(Practical Part)

NOTE: Attempt any Two (2) questions.

A.(i) Write procedure to demonstrate through experiment that exhaled air contains CO_2. (3)

Ans 1. Take two conical flasks and mark them 'A' and 'B'.

2. Fill $\frac{1}{4}$ volume of each flask with limewater.
3. Close flask 'B' with a cork.
4. Pass a glass tube through another cork and fix it on the mouth of flask 'A'.
5. Take a deep breath and blow air in flask 'A' through the glass tube.

Observe the color changes in both flasks of lime water.

(ii) Define the Exhalation. (2)

Ans **Exhalation:**

"The phase of breathing in which air is expelled from the lungs is called exhalation."

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B.(i) Draw and label the diagram observed of Mammal's eye. (3)

Ans

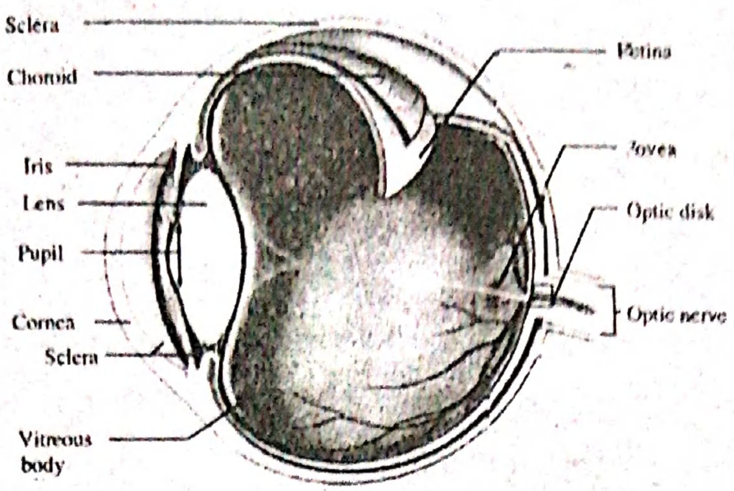
Sclera
Choroid
Iris
Lens
Pupil
Cornea
Sclera
Vitreous body
Retina
Fovea
Optic disk
Optic nerve

Fig. The structure of a typical mammalian eye.

(ii) Write the name of any four parts of eye. (2)

Ans Following are any four parts of an eye:

1. Retina 2. Sclera 3. Fovea 4. Cornea

C.(i) Draw and label the diagram observed of Bulb of Onion. (3)

Ans

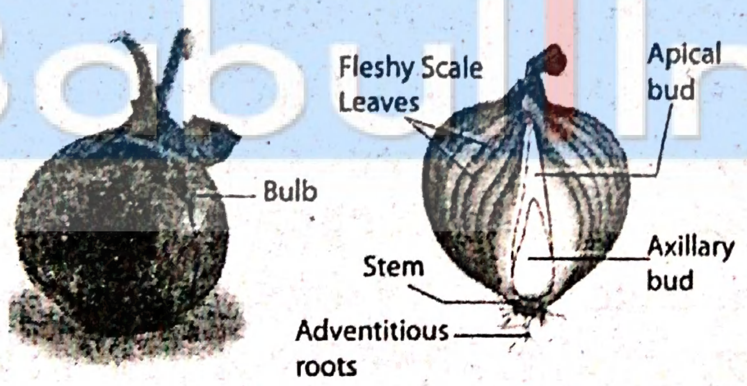
Fleshy Scale Leaves
Apical bud
Bulb
Stem
Axillary bud
Adventitious roots

Fig. Bulb of onion.

(ii) Define stem tuber. (2)

Ans **Stem tubers** are the enlarged portions of an underground stem (rhizome). There are aggregations of tiny buds in the forms of "eyes" along the surface of tuber. Each bud develops into shoot that grows upward and also produces roots.

Potatoes and yams reproduce by tubers.